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Silver Bow Creek/Butte Area Superfund Site

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WARM SPRINGS PONDS UPDATE

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U.S. Environmental Protection Agency, Montana Office
and the
Montana Department of Health & Environmental Sciences

July 1991

FOR HISTORY AND BACKGROUND OF WARM SPRINGS PONDS, REFER TO INSERT.

Separate Record of Decision For Pond 1 And Lower Area

The September 1990 Record of Decision for the Warm Springs Ponds defers an action decision for the area north of Pond 1 for one year. Part of the complexity in making a decision for remediation of this lower area is that the shallow groundwater is contaminated with metals, primarily arsenic and cadmium. EPA wants to assure that contaminated ground water does not enter the Clark Fork River or descend to deeper aquifers. Further, the contaminated tailings and sediments in Pond 1 and the lower area are among the most extensive within the pond system.

These factors, together with public input, have led EPA to declare Pond 1 and the lower area a new and separate study area or operable unit. By doing so, a separate Record of Decision is necessary. This enables EPA to progress with the remedial action described in the September 1990 Record of Decision for the other portions of the Warm Springs Ponds area. These active portions, including Ponds 2 and 3 and most of the Mill-Willow bypass, will continue under the original direction of the September 1990 Record of Decision. Work is being deferred on Pond 1 and the lower area until a decision can be made with full public review. The decision to divide the Warm Springs Ponds into two separate units is described in detail in the June 1991 Explanation of Significant Differences.

EPA ISSUES NOTICE TO BEGIN WORK

On June 7, 1991, EPA issued a special notice to ARCO to begin implementation of the remedy as described in the September 1990 Record of Decision, as modified by the June 1991 Explanation of Significant Differences. All remedial activities will take place with EPA oversight and are anticipated to be complete within two to three years.

This Update Describes:

- Separate Record of Decision for Pond 1 and Lower Area
- Mill-Willow Bypass Removal Action
- Treatment Capabilities of Ponds 2 & 3
- History and Background of Warm Springs Ponds

EPA has received a proposal from the Atlantic Richfield Company (ARCO) for reducing the groundwater contamination and isolating the tailings and contaminated soils within Pond 1 and the lower area. ARCO has proposed to chemically fix and wet-close (cover with water) the east half of Pond 1 and the contaminated area below Pond 1 (See Figure 1). In the proposed plan of October 1989, the EPA and the Montana Department of Health and Environmental Sciences (MDHES) had proposed to dry-close (excavate and cover with soil) all of Pond 1 and remove about one-sixth of the tailings below Pond 1, along the old Silver Bow Creek channel. EPA will bring all proposals to full public review during the fall of 1991.

Mill-Willow Bypass Removal Action

The original Mill-Willow bypass was constructed around 1970 to divert the relatively clean water from Mill and Willow creeks around the pond system. Prior to that, Mill and Willow creeks joined Silver Bow Creek just above the present location of Pond 3. The bypass channel became contaminated when the inlet to Pond 3 became plugged with runoff debris, causing Silver Bow Creek to flow into the bypass channel. This deposition of tailings along the bypass has happened repeatedly over the past 20 years. Numerous fishkills occurred during that period, usually following summer thunderstorms which washed metals-bearing salts into the bypass streams and the upper Clark Fork River. Following a July 1989 thunderstorm, more than 5000 trout and unknown numbers of other aquatic organ-

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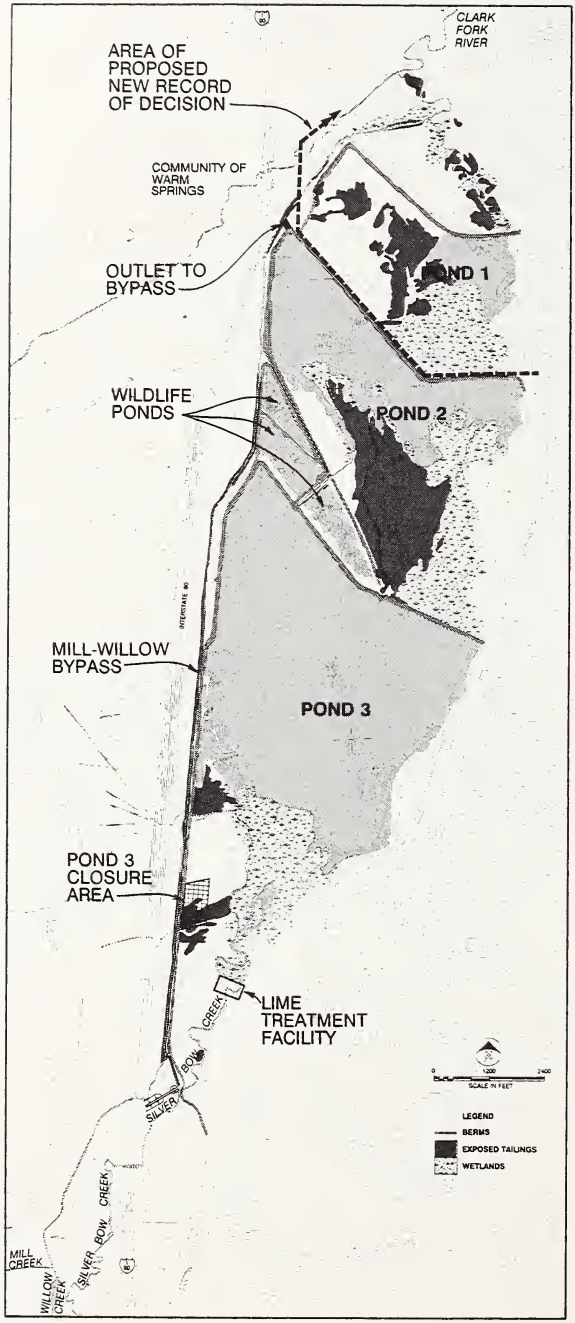


Figure 1
COMPONENTS OF WARM SPRINGS PONDS AND MILL-WILLOW BYPASS

isms were killed by exposure to heavy metals. These fishkills prompted EPA and MDHES to initiate the Mill-Willow Bypass Removal Action.

The tailings removal work began in July of 1990 and was mostly complete by November of 1990. The work was done under an Administrative Order on Consent issued by EPA to ARCO. ARCO hired local contractors to perform the work. Individuals from EPA and MDHES were present on a daily basis during the entire removal action. Water and soil samples were routinely taken throughout the action. All of the engineering design work was carefully reviewed and approved ahead of time by EPA and MDHES.

A total of 436,000 cubic yards of tailings and associated soils was removed from the 3.8-mile bypass channel. EPA and MDHES feel that the removal action was successful in returning the bypass channel to natural metals levels. Table 1 reflects the improvement of metals concentrations in the bypass soils following the removal action. The tailings and contaminated soils were removed and placed in a 25-acre dry closure area within Pond 3. All of this material was placed above the water level behind reinforced berms, and covered with limestone and soil. The area was planted with native grasses in the spring of 1991.

In addition to the tailings removal, the berms between the bypass and the ponds were improved. The berms were raised, widened, and armored to provide maximum protection against earthquakes and floods. A soil cement armor, 9 feet thick, was applied to the bypass side of the pond berms to help prevent erosion during severe floods. The channel has been greatly enlarged to allow passage of 70,000 cubic feet of water per second (CFS), which is estimated to be one-half the probable maximum flood amount. An important component of the improved bypass is that it will be able to contain the water from a major flood without threaten-

TABLE 1
Average Metals Concentrations In Soils Pre-Removal, Post-Removal and Natural Parts Per Million

	Pre-Removal	Post-Removal	Natural
Arsenic	244	14.8	12-30
Cadmium	9	1.1	<1
Lead	238	16.3	12-20
Copper	2,758	64.7	20-50
Zinc	1,996	124.4	30-100

Warm Springs Ponds

History and Background

The Warm Springs Ponds are part of the Silver Bow Creek/Butte Area Superfund Site in the Upper Clark Fork Basin area of Montana. They cover approximately 2500 acres and include three settling ponds, the area north of Pond 1 to the Clark Fork River's beginning point, a series of wildlife ponds, and the Mill-Willow bypass.

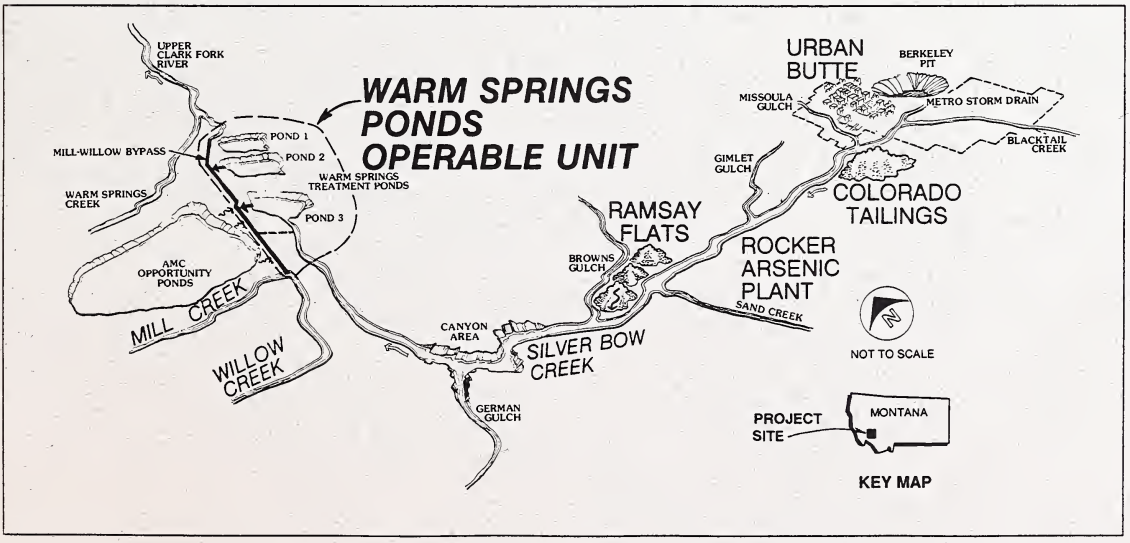
From 1880 until the 1970's, mining, milling and smelting wastes from the Butte and Anaconda areas were dumped directly into Silver Bow Creek. Early on, these wastes were transported downstream as far as Milltown Reservoir, a distance of 145 river miles. Along this entire distance, tailings and contaminated sediments settled out as floods receded, creating "slickens". These metals-bearing deposits are more numerous and expansive along Silver Bow Creek than along the Clark Fork River; however, the river still suffers today from the effects of these deposits.

Beginning about 1911, the first pond was created on Silver Bow Creek near the town of Warm Springs to control the amount of sediment carried into the Clark Fork River. Later, in 1916 and 1959, Ponds 2 and 3 were constructed. An estimated 19 million cubic yards of sediments, tailings and heavy metal sludges have been collected in the three ponds. In addition to this massive volume of contaminated material, other problems at the pond include contaminated groundwater, periodic exceedences of surface water quality standards, unstable berms, fishkills and tailings that are subject to wind erosion.

The EPA, in consultation with MDHES, produced a Record of Decision on the Warm Springs Ponds in September of 1990 which identified the selected remedy for correcting problems associated with the ponds. The Record of Decision was prepared following extensive public input. In general, the remedy includes means for:

- Allowing the ponds to continue to function as treatment ponds until upstream sources of contamination are eliminated,
- Raising and strengthening the pond berms to protect them from failure during floods and earthquakes,
- Comprehensively upgrading the treatment capabilities of Ponds 2 and 3, and
- Removing tailings from the Mill-Willow bypass.

EPA and MDHES continue to strive to involve all interested parties. Public scoping meetings on the Mill-Willow Bypass Removal Action were held in February of 1990. The agencies held five more public meetings in February and May of 1990 to gather input from the public on the removal activities and other actions planned by the agencies and ARCO. The public will be asked for input on future activities as well.



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ing the stability of either the pond berms or the tailings stored behind them.

Before the removal work of 1990 was complete, plans were underway for rehabilitating the area. Beginning in the summer of 1992, the bypass will be revegetated and reconfigured to create a meandering stream system within the channel. The bypass is expected to provide excellent trout and waterfowl habitat when ARCO completes this work.

Two amendments have been made to the Administrative Order between EPA and ARCO, enabling ARCO to proceed with reinforcement work on the east-west berms of Ponds 2 and 3 and with improvements to flood control structures. These activities will be completed during the summer of 1991.

Treatment Capabilities of Ponds 2 & 3

The Warm Springs Ponds have been successfully containing and treating water from Silver Bow Creek for many years. The addition of Pond 3 in 1959 greatly improved the ponds' treatment capabilities with the exception of those occasions when the inlet became plugged and Silver Bow Creek found its way into the bypass channel. Currently, the ponds can receive no more than 600 CFS of water flow from Silver Bow Creek. Although the average flow of Silver Bow Creek is about 90 CFS, spring runoff flows are expected to exceed 600 CFS approximately once every other year. When this occurs, or when the inlet becomes plugged, Silver Bow Creek enters and contaminates the bypass channel.

Once the remedy for the Warm Springs Ponds is in place, Pond 3 will be able to receive up to 3,300 CFS and therefore have the ability to treat flood waters up to the 100 year flood amount. The ponds will continue to function as a treatment system for Silver Bow Creek as long as there is upstream contamination. When the entire Silver Bow Creek/Butte Area Superfund Site is cleaned up and all upstream contamination is controlled, the fate of the pond system will be reexamined. The ponds may be retained, or they may be partially dewatered to become a vast wetlands area. In any case, they will always serve as a "safety net" even after remedies for Butte and Silver Bow Creek are in place.

The water treatment occurring in Ponds 2 and 3 acts on both suspended sediments and dissolved metals that continually enter the ponds from Silver Bow Creek. Removal of contaminants from the water is accomplished by physical, chemical and biological processes. The initial settling and chemical treatment begins quickly as water enters Pond 3. A simple physical reduction of metals-bearing solids occurs through gravitational settling of sediments in the ponds. A chemical lime treatment causes oxides to react with metals, creating soluble precipitates that remove the dissolved metals from the water. Finally, biological processes act as a finishing treatment. During this process, living algae act on metals and absorb them. When the algae die, they settle to the pond bottom and a sludge forms.

An improved treatment system will be part of the remedy for the Warm Springs Ponds. It will include a lime dispensing facility located at the inlet south of Pond 3 where carefully calculated amounts of lime will be added to the water to create the proper pH level. Treated water will be routed into an enlarged Pond 2 for additional biological treatment and retention time, then out of Pond 2 into the Mill-Willow bypass. The discharged water will be monitored regularly. With the exception of the emergency spillways, ARCO will be required to meet stringent water quality standards for all discharge points from the ponds. Also, as part of the remedy, the tailings in Pond 2 will be wet-closed, meaning that the exposed tailings will be flooded, thus eliminating direct contact by humans or wildlife.

The effectiveness of the Warm Springs Ponds as a treatment system for removing arsenic and heavy metals has already been proven. The first few miles of stream immediately below the ponds are currently the most productive trout and aquatic invertebrate habitat in the entire upper Clark Fork River. Up to 2000 trout per river mile have been counted during surveys. However, the number of trout declines sharply to less than 200-300 per river mile between Deer Lodge and the mouth of Rock Creek above Missoula. Many factors account for this reduction, including irrigation dewatering, banks degraded by livestock, high water temperatures, and the reaccumulation of metals as the water flows downstream. The selected remedy will significantly improve the ponds' treatment capabilities, particularly at higher flows and greater volumes.

The following Warm Springs Ponds documents are available for public review:

- Warm Springs Ponds Proposed Plan, Silver Bow Creek Superfund Site Report, USEPA and MDHES, October, 1989.
- Record of Decision, Silver Bow Creek/Butte Area NPL Site, Warm Springs Ponds Operable Unit, Upper Clark Fork River Basin, USEPA, September, 1990.
- Clark Fork Superfund Sites Master Plan, USEPA and MDHES, November, 1990.
- Soils Removal Report, Mill-Willow Bypass Removal Action, Warm Springs Pond Operable Unit, Warm Springs, Montana, Atlantic Richfield Company, March, 1991.
- Explanation of Significant Differences to the September 1990 Record of Decision for the Warm Springs Ponds Operable Unit, June, 1991.

The previous listed documents can be found at these information repositories:

- Montana Tech Library/Butte
  West Park Street
- Butte-Silver Bow Library/Butte
  106 West Broadway
- Grant-Kohrs Ranch Office/Deer Lodge
  Main Street
- Mansfield Library/Missoula
  University of Montana Campus
- Montana State Library/Helena
  Capitol Complex
- USEPA Library/Helena
  301 South Park
- Hearst Free Library/Anaconda
  Fourth and Main

For further information regarding the Warm Springs Ponds, contact the following individuals:

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Janie Stiles or Neil Marsh, MDHES
Solid & Hazardous Waste Bureau
836 Front Street
Helena, MT 59601
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